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- ☐ Model(s)
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Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this

United States Patent

Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America for the term set forth below, subject to the payment of maintenance fees as provided by law.

If this application was filed prior to June 8, 1995, the term of this patent is the longer of seventeen years from the date of grant of this patent or twenty years from the earliest effective U.S. filing date of the application, subject to any statutory extension.

If this application was filed on or after June 8, 1995, the term of this patent is twenty years from the U.S. filing date, subject to any statutory extension. If the application contains a specific reference to an earlier filed application or applications under 35 U.S.C. 120, 121 or 365(c), the term of the patent is twenty years from the date on which the earliest application was filed, subject to any statutory extension.

J. Todd Pichini

Acting Commissioner of Patents and Trademarks

Margaret V. Turner

Attest



US005869353A

United States Patent [19]

Levy et al.

[11] **Patent Number:** 5,869,353[45] **Date of Patent:** Feb. 9, 1999[54] **MODULAR PANEL STACKING PROCESS**

[75] **Inventors:** Aaron Uri Levy, Stanton; John Patrick Sprint, Huntington Beach; John Arthur Forthun, Glendora; Harlan Ruben Isaak, Costa Mesa; Joel Andrew Mearig; Mark Chandler Calkins, both of Huntington Beach, all of Calif.

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[21] **Appl. No.:** 971,499

[22] **Filed:** Nov. 17, 1997

[51] **Int. Cl.⁶** H01L 21/44; H01L 21/48; H01L 21/50

[52] **U.S. Cl.** 438/109; 438/110; 438/111; 438/113

[58] **Field of Search** 438/113, 111, 438/110, 109, 366, 368

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[57]

ABSTRACT

A method of making chip stacks begins with the formation of a plurality of panels having apertures therein and conductive pads on opposite sides thereof. Solder paste is deposited on the conductive pads prior to mounting plastic packaged IC chips within each of the apertures in each of the panels so that opposite leads thereof reside on the conductive pads at opposite sides of the apertures. The plural panels are then assembled into a stack, such as by use of a tooling jig which aligns the various panels and holds them together in compressed fashion. The assembled panel stack is heated so that the solder paste solders the leads of the packaged chips to the conductive pads and interfacing conductive pads of adjacent panels together, to form a panel stack comprised of a plurality of chip package stacks. Following cleaning of the panel stack to remove solder flux residue, the individual chip package stacks are separated from the panel stack by cutting and breaking the stack. Score lines across a topmost panel and transverse slots within remaining panels therebelow result in the formation of strips of chip package stacks when longitudinal cuts are made through the panel stack. The remaining portions of the uppermost panel within such strips are then snapped along the score lines thereof to separate the individual chip package stacks from the strips.

6 Claims, 5 Drawing Sheets